

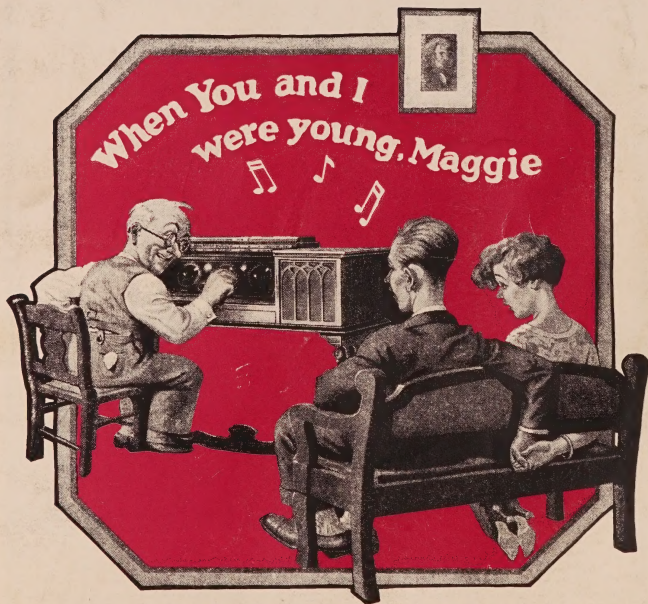
CHRS

official

JOURNAL

Vol.4 No.4

December 1979



Whatever Happened to Atwater Kent?
Collector Spotlight: Bob Herbig • **The Magnavox Tube**
1979 AWA Conference • Feature Set: Radiola III

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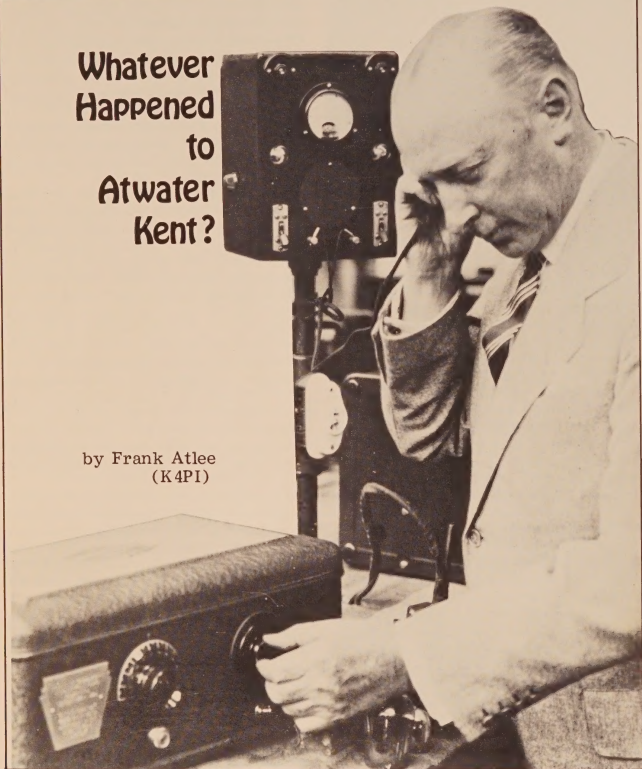
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CHRS Official Journal is published by California Historical Radio Society, Box 1147, Mountain View, CA 94040. Address membership correspondence to James Cirner, CHRS Treasurer, 13366 Pastel Lane, Mountain View, CA 94040. Articles and non-commercial ads for the Journal should be submitted to Allan Bryant, Editor, 38262 Ballard Drive, Fremont, CA 94536. Historical data for copying or donation should also be sent to the Editor.

The OFFICIAL JOURNAL of CHRS is published quarterly and furnished free to all members. The first issue (published in September 1975) is still available (\$2.00), other early issues are \$1.00 each. Articles for the Journal are solicited from all members. Appropriate subjects include restoration hints, information on early radio broadcasts and personalities, anecdotes about the pioneers, etc. Anyone interested in assisting in producing the Journal should contact the Editor.

Whatever Happened to Atwater Kent?

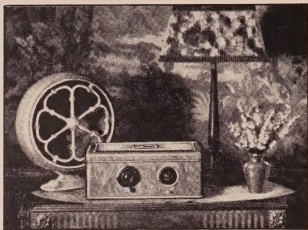
by Frank Atlee
(K4PI)



ALTHOUGH more than 40 years have elapsed since the name Atwater Kent was a household word, the radio receivers he manufactured were so well made that thousands are still in existence and in operating condition. Many more Atwater Kent receivers are unearthed daily from cellars and attics to be restored by antique-radio collectors and made conversation pieces for modern living rooms.

The story of this unusual man and his company in many ways parallels the heyday of mass production ascribed to the Ford Motor Company. At one time, Atwater Kent was a company known the world over and even the most conservative estimate of its manufacturing facilities indicates that it produced well over 5,000,000 radio receivers.

The Atwater Kent Company was a well-established manufacturing business



The A-K Model 37 was a 7-tube a.c. operated receiver with the popular 2 r.f., detector, 2 audio circuit.

nearly 20 years before the first radio broadcast. Starting with the making of voltmeters for telephone linemen, the company gradually expanded to include the manufacture of ignition systems, starters and generators for pre-World War I automobiles.

Residing on the "Main Line," then the home of many wealthy Philadelphians able to purchase the fine cars of the day, Kent observed that ignition systems and electric starters (if any) were usually under-designed and subject to frequent failures. Kent purchased several dozen used cars on which to work toward developing improved electrical systems. In a short time, he had invented the "Unisparker" and in 1914 received a medal from the Franklin Institute of Philadelphia. He also developed his type "LA" ignition system for the Model T Ford. Having worked closely with 4- and 6-cylinder engines, Kent predicted that eventually the 4-cylinder engine would be a thing of the past.

First Expansion. Sensing that the market for his automotive products was rapidly expanding, in 1914 Kent purchased a large tract of ground north of the Wayne Junction branch of the Reading Railroad in Germantown, Philadelphia. As soon as this factory was completed, he partially switched over production during World War I to the manufacture of gun-sights.

Kent's long-range plans for the post-war economic boom did not materialize and in 1920-21 Kent found himself in a temporary business depression. Scouting around with his usual keen vision for

products to manufacture, he decided to look into the new craze of radio broadcast listening. Kent hired two well-known Philadelphia radio engineers and from a modest start in making transformers he rapidly branched out into the manufacture of tuning units, detectors, and one-to three-tube amplifiers.

Kent even assembled a five-tube radio receiver with all transformers sealed in tar in a metal container about the size of a one pound coffee can.

Labelled the Model 5, 100 of these "breadboard" receivers were sent to each of Kent's nationwide auto parts distributors. A somewhat similar experimental receiver had been presented to President Harding in August, 1921. This was the first radio receiver installed in the White House and it was this type of publicity which Kent used more and more during the "Roaring 20's." Until late 1923, Kent concentrated on the manufacture of individual radio parts, all of beautiful appearance and fine construction. At the same time Kent conducted a vigorous advertising campaign in consumer magazines such as *The Saturday Evening Post*, plus hobby magazines like *Radio News* (now *Electronics World*).

To avoid becoming entangled in the complicated patent situation that existed regarding radio circuits, Kent purchased, for a moderate sum, the rights to a number of inventions of his previous patent attorney and hired a new attorney to help plan for future developments.

Mass Production. Quick to watch for business opportunities and to consider suggestions from his nationwide distributors, Kent announced, for the Christmas buying season of 1923, his famous Model 10 radio. This was a five-tube receiver with all parts mounted on an attractive wooden board and the wiring channeled out of sight beneath the board. The immediate demand for this receiver was tremendous and some months later, Kent modified and improved the original Model 10 and added a four-tube Model 9 receiver to his line.

In late 1924 at the insistence of his distributors and in view of the competition from the growing number of makers of console-style receivers, Kent announced the Model 20—a five-tube TRF receiver in an attractive mahogany cab-

inet with a gold-color nameplate. By the spring of 1925, his engineers had designed an almost identical receiver about half the physical size, which Kent personally named the "20 Compact." Kent felt that this name was a concession and an attraction to the growing number of women who had become fascinated by listening to radio broadcasts.

Kent now envisioned an unlimited increase in demand for radio receivers and decided to enlarge his manufacturing facilities. He purchased a large vacant parcel of ground on Wissahickon Avenue in Germantown. The new factory was a single-story modern (then) building with good lighting for both factory and office employees. There were imposing entrances and when one passed through the reception area, practically the entire office force was visible and the heads of departments were located so that they could keep an eye on the lower echelons of office workers. This is not to say that the arrangement was designed to encourage staff heads to spy on employees; as a matter of fact, all desks were well separated and office employees were treated with more consideration than those of competitive radio manufacturers.

Kent himself occupied a complete suite of offices including a dining room, kitchen and dressing room. This arrangement was used to great advantage since every day Kent invited to lunch a number of his company executives. Many of the

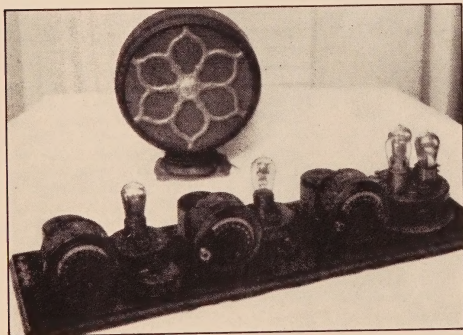
important future plans were announced over the luncheon table with Mr. Kent speaking in a semi-New England accent with the intermittent broad *a*.

The Peak Years. From the time of his move into the larger new factory until the depression of late 1929, the Atwater Kent business expanded by leaps and bounds. While progress was being made in the design of radio receivers, Kent continued to manufacture ignition systems for the Model T Ford, which itself remained in mass production until late 1928.

The small three-dial console receiver was replaced in early 1926 by the single-dial Model 30, plus variations of the latter such as the Model 33 with a tuned antenna circuit and, later in 1926, the Model 32 with four stages of tuned r.f.

In 1927 Kent turned out a battery eliminator of pleasing appearance to replace the unsightly B batteries, but it was not until RCA developed tubes in which the filaments could operate on alternating current that the true all-household electric radio receivers became a reality at a moderate price. In 1928, Atwater Kent sold nearly 1,000,000 a.c.-operated radio receivers, mostly table models, in metal cabinets with a single tuning dial.

In the early 20's, while still located in the Stenton Avenue plant, Atwater Kent did not make a loudspeaker, only an attachment used to play the output of the



Model 10 was next to the top of the A-K line in 1923 selling for \$80. Open breadboard design with the connecting wires hidden under the fine wooden finish was a particular trademark of A-K. Speaker in background is from another A-K era around 1927 when Kent recognized the importance of selling loudspeakers. (Author's collection)

radio receiver through the horn of a phonograph. These attachments did not do justice to the audio quality of the receiver and in 1924 Kent had his engineers trying to develop a loudspeaker with quality equal to that of the receiver.

At that time, the Timmons Company was doing a brisk business selling a large "Music Master" horn loudspeaker with a wooden bell. The Kent engineers concluded that an all-metal horn loudspeaker could give better performance. A variety of sizes of metal horn loudspeakers was made and they sold in large



Kent followed the Henry Ford thinking and manufactured receivers on an assembly line. Factory conditions were better than most companies of the day.

quantities until the magnetic cone loudspeaker with more pleasing and decorative appearance—as well as excellent reproduction—replaced horn speakers. Many different sizes and finishes of cone speakers were made in 1927-28. Advertisements showing the Atwater Kent receiver and loudspeaker appeared around the world in newspaper, magazine and catalog advertising.

Competition and the Depression. Competitors to Atwater Kent were not sitting on the sidelines while such enormous inroads were being made in the volume sales of radio receivers. By 1928 the Majestic Corporation had developed a high-quality dynamic speaker that was capable of reproducing a much lower range of musical notes and in 1929 Kent designed a table model for use with a separate dynamic speaker. The distinctive mark of all of these 1928-29 radio receivers was a goldplated emblem of a full rigged sailing ship secured to the top or lid of the unit. Meanwhile, Kent used up the remainder of his magnetic

speakers by manufacturing a limited quantity of "End Table" metal receivers using the 1928 chassis.

At the annual sales convention in August, 1929, the Kent wholesalers had placed enormous orders in anticipation of a continuing sales boom in radio receivers. After the stock market crash however, orders were cut substantially and Kent was obliged to trim his sails. In early 1930, he had concluded that new aggressive sales techniques and advertising methods were called for.

Meanwhile, his engineers were furiously designing a console-type receiver chassis that would surpass in appearance and performance that of his competitors. At the August, 1930 sales convention in Atlantic City, Kent announced and displayed the famous Model 70 and showed samples of a console cabinet which Kent was not going to manufacture. He informed his distributors at the convention that installation of the chassis into the console was to be made either by the wholesaler or retailer. The entire receiver, which was called the "Radio with the Golden Voice," was promoted in national magazine ads and billboards throughout the country. The dial, in the shape of a large illuminated arc, soon became well-known in the trade and to the general public. The price of this receiver was \$275!

Meantime, a local competitor announced a four-tube table model radio receiver with a rounded top selling at the attractive price of \$59.50. While there was probably little profit in this small receiver, it was intended as a lever for retail salesmen to talk the buyer up to the price level of a console. But, as the depression worsened and it became clear that prosperity was not around the corner, Kent's wholesalers insisted that he make a competitive model. Unfortunately, he held off doing so until the spring of 1931 with the result that receiver sales in 1930-31 were drastically reduced.

Although it had become painfully evident that the boom sales of the early and mid-1920's could no longer be expected, Atwater Kent continued to turn out high-class models, both table and consoles, as well as radio phonographs. In the 30's, Kent also turned out several radios for use in automobiles and to

satisfy the public's interest in short-wave listening, Kent announced various models with two, three or four bands. Later, in 1935, Kent conceived the idea of adding some home appliances to his line of products. The company designed and sold 6000 electric refrigerators. However, the venture was not as successful as had been expected and was abruptly discontinued.

Big Government and Big Labor. Atwater Kent treated his employees exceptionally well. Although he paid no bonuses and sold no stock in his company, he realized that public generosity could benefit the image of a multi-millionaire manufacturer. Insofar as his employees were concerned, as early as 1925 Kent had established a "Welfare Fund" and had made sizable contributions to it. When seasonal layoffs were required, this fund was used to tide over his unemployed personnel until full manufacturing production was resumed. Such an arrangement was unique in the days before Social Security and Unemployment Compensation.

Possibly because Atwater Kent was such a staunch Republican and strictly a self-made millionaire, the New Deal programs of President Franklin D. Roosevelt seemed an invasion of his personal

rights. The very idea of enforced Social Security and Unemployment Compensation rubbed Kent the wrong way.

In the fall of 1933, union organizers began to muscle in on the radio manufacturers in the Philadelphia area. This resulted in a short strike at the Atwater Kent Company and it was settled by an agreement involving a 10% pay increase. At the time of the settlement, Kent informed the union leaders that any future attempt to interfere with his management of the business would result in his shutting down the manufacturing plant for good. From then, until June, 1936, the Atwater Kent Company continued to produce new models to conform with the trend of the times, but as sales gradually decreased and profits became marginal, it was abundantly clear that the time left for the company was growing shorter.

Arthur Atwater Kent was then 62 and there was no individual, or group, he felt he could trust to maintain the good name he had built up over the years. Consequently, when union organizers approached Kent in the late spring of 1936, he bluntly informed them that, rather than grant any of their demands, he would close down the manufacturing plant and put the business up for sale. To the several thousands of employees



This is a corner of the author's fine collection of Atwater-Kent and other antique radio receivers, microphones and keys of 1920-25. Author worked at the A-K factory.

still working, this announcement was a tremendous shock. The engineering and production departments had been planning for a vigorous fall selling season and his employees undoubtedly assumed that Kent would make a settlement. When it became clear that Kent was as good as his word, a group of about 20 of his top men pleaded with him to allow them to take over the business. To their mutual dismay, Kent refused and in June, 1936, the doors of the plant were closed for good.

Those employees that had been working for Kent for 20 years were given three months salary as severance pay, but most of the others were fortunate if they could find employment either with competitive radio manufacturers or in the now well-established appliance business.

Kent himself immediately headed for California, bought a palatial estate in the Bel Air section of Los Angeles and proceeded to enjoy the fruits of his many years of highly profitable enterprise. He became well acquainted with many of the celebrities of Hollywood and was noted for the extravagant parties that

Atwater Kent, the Philanthropist

Always very publicity conscious, Kent's most notable contribution was in promoting the public's interest in music. In particular, he sponsored opera broadcasts on the radio networks. The first of these broadcasts was in October, 1925. In addition, Kent supported local schools of music in Philadelphia and provided scholarships in music to promising local singers, including Philadelphia's Wilbur Evans, who later became nationally famous.

Through his original connections with New England, he contributed liberally to the Perkins School for the Blind; and, toward the end of the manufacturing period for battery-operated radio receivers, he ordered the donation of a large quantity of these receivers to the merchant fishing fleet sailing out of Boston Harbor.

Another step taken by Atwater Kent to prevent his name from becoming forgotten was the establishment of the Atwater Kent museum in a small building on South 6th Street in downtown Philadelphia, not far from his original place of business. The museum does not display his manufactured products but is devoted primarily to historical items of Philadelphia.

His many philanthropic and charitable contributions were not tax deductible since there was no applicable income tax in those days. Considering that the Atwater Kent Manufacturing Company, Inc. was owned and controlled by Mr. Kent himself, with only one other minority stockholder, one can scarcely imagine the profits that were made during the free-spending boom years of 1924-1929.

Some Highlights in the A-K History

In late 1926, Atwater Kent announced that he had manufactured his one millionth a.c. operated radio receiver. The original of this receiver was allegedly donated to the then King of Spain. However, a sufficient number of these sets (the Model 35) all in a gold-plated finish and all with serial numbers starting at 1,000,000 were shipped to his wholesalers for display.

In 1927, Kent was visited by Helen Keller and her companion. Miss Keller was personally conducted on a tour of the plant and was presented with a special radio receiver and magnetic cone speaker. By pressing her fingers lightly on the speaker cone she was able to enjoy music through the delicate vibrations of the cone.

In the next year, the famous Russian inventor, Leon Theremin, visited the Kent factory with the intention of selling the patent rights to the manufacture of his electrical musical instrument. A working model of the Theremin was in the Atwater Kent laboratories for several months when it was finally decided that the instrument was too much of a novelty. A year later, RCA bought the patent rights, but at a selling price of \$300 per Theremin, the project was a financial failure and gladly forgotten.

In August, 1928, the two millionth radio receiver was given to Mrs. Thomas A. Edison.

he gave on his estate. In the spring of 1949 he became hospitalized with a virus infection and passed away at the age of 75.

At the time of the closing of the Atwater Kent manufacturing plant, the building had been put up for sale and was to include his past advertising, name, trade outlets, and good will—all for a price of \$11,000,000. However, 1936 was not a propitious year for such a sale and it wasn't until 1939 that the Bendix Corporation occupied half of the plant to manufacture war materials. The other half of the plant (the 1929 addition) was soon occupied by the U.S. Signal Corp. as a training school for radio inspectors and a depot for accumulating the amateur radio equipment used by the Armed Forces in 1942-43. After the war, the entire plant building was taken over by the Veterans Administration and is still occupied by that organization. —50—



A. ATWATER KENT

PRESIDENT AND FOUNDER OF THE
ATWATER KENT MFG COMPANY

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Model 10 Open Receiving Set

A FAVORITE with thousands of owners of Atwater Kent Radio. The equal of the Model 20 in performance and with a color scheme and finish that is strikingly rich and beautiful.

Two Stages of Tuned Radio Frequency Amplification, a Detector and Two Stages of Audio Frequency Amplification, with three tuning dials.

Dimensions: Length, 20 $\frac{1}{4}$ in.; Depth, 10 in.; Height (when tubes are inserted), 7 $\frac{1}{2}$ in. Number of tubes required, 5. Non-radiating, non-squealing.

Part No. 4700, Model 10 Receiving Set, including Battery Cable, but without Tubes, \$80.



1979 AWA National Conference

Once again the resort town of Canandaigua, New York was the scene of this outstanding event. Attendance exceeded 600 and the flea market and auctions were busier than ever which indicates that interest in our "obsession" has certainly not abated. Although the Conference did not formally commence until September 27, the early birds started arriving several days before that date and the flea market was quite busy by the middle of the week. Technical sessions commenced Thursday evening and the Conference ended two days later after the Annual Banquet held on Saturday evening.

PROGRAM

The technical sessions covered a wide variety of interests including the first paper given on commercial activity in Canada. Another "first" was Lou Moreau's demonstration by slides as to the dramatic increase of involvement of women in the field of communications over the last 100 years. An illustrated show depicting amateur equipment of the 30's was well received as was a demonstration of early television using a Nipkow disc. Another slide show provided a pictorial history of early tubes and finally the ever popular session on restoration and repair of equipment concluded the sessions.

AUCTIONS

As usual, two auctions were held, one for general equipment and the other for tubes. The former

grossed about \$15,250 and the latter about \$2000. Since the A.W.A. Museum Fund receives 10% of the proceeds, it is encouraging to find that the auctions are well received. Since auction prices are of general interest, the following items have been selected at random to indicate price trends (at least as indicated at this event).

EQUIPMENT AUCTION

AK desk sign: \$100
 AK banner: \$200
 Philmore crystal set: \$45
 AK-10: \$360
 AK radiodyne: \$375
 Crosley V: \$180
 Crosley 51: \$70
 Crosley 52: \$75
 Crosley Pup: \$185
 Radiola 24: \$125
 Radiola III (with tubes): \$75
 Regenoflex X: \$150
 Aeriola Sr. (with B.B. tube): \$180
 Amarad double deck set: \$650
 Murdock Neutrodyne: \$150
 G.R.BC-14A: \$210
 Music Master horn: \$175
 Bristol Horn: \$80
 B.C. 9: \$115
 Grebe MUI: \$185
 RADA: \$135

TUBE AUCTION

30 OIA's: \$90
 Moorhead: \$35
 UV202: \$15
 VT-1: \$11
 DeForest Audion (2 good fil.) \$200
 UV200-B.B.: \$16
 Audiotron (2 good fil. and label): \$50
 2 215A's (Boxed): \$30
 2UX12's: \$16
 Tubular audion (no fil./label) \$37
 3 UV201's (B.B. Tipped): \$32
 Audiotron (1 open fil. no name): \$32
 Myers (open fil.): \$20
 VT2 (boxed): \$15

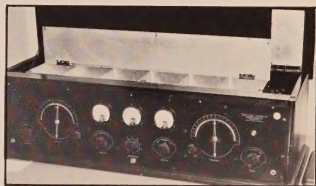


Elliot Sivowitch (K3RJA), curator from the Smithsonian Institution viewing "Felix the cat" as he spins around on a phono turntable from nearby scanning-disc television transmitter. Demonstration and talk by Bob Lozier, Monroe, NC

2 DL2's: \$15
 6 WD12's B.B. Tipped: \$75
 UX200 (Boxed): \$9
 DL4 and DL7: \$20
 WD11 (boxed): \$19
 DeForest 431: \$6
 2 W.E. 205D: \$11

EQUIPMENT CONTEST

The ever-popular equipment contest brought forth a large number of entries including artifacts dating back to 1893. Quality was excellent and judging must



Norden-Hauck Super-10, typical of the many receivers on display in the contest room.



Joe Pavsek (W00EP), from Minneapolis, MN receiving Houck Award for outstanding work in preserving historical artifacts. Joe has been AWA's auctioneer for 12 yrs. Ernest de Coste (Canadian Nat. Science Museum) presents award.

- Misc. receivers
E.S. Ritchie @ Sons
- Spark transmitters
Dubilier variable tone
- *Tube transmitters
W.E. Submarine chaser
complete station (W. W. 1)
- Vacuum tubes
Set of eight Moorheads
- Edison's contributions
to communications
Edison home kinetoscope
- Other Edison artifacts
Set of documents etc.
dating from 1893-1914

*Best of show (fantastic exhibit)

A.W.A. paid tribute to Thomas Alva Edison during this Conference in commemoration of the 100th anniversary of his invention of the first practical incandescent lamp. A special session for this purpose was held Friday evening and a remarkable display of Edison artifacts were on display in the equipment contest, as noted above.

The annual banquet taxed the capacity of the dining room and was, of course, the prime social event of the Conference. In addition to recognizing distinguished radio pioneers, we were honored by the presence of curators from the following prestigious Museums: The Canadian National Science Museum, Ottawa; The Smithsonian Institute, and the Ford Museum.

Your Society was extremely well represented inasmuch as we had the largest number of members in attendance from California since inception of A.W.A. (to the best of our knowledge). Keep this annual event in mind. Those who are fortunately able to attend should by all means do so----it's an experience to be remembered.

have been difficult. Space does not permit a listing of all of the covered awards. Here are a few of the winners:

- Crystal sets
Ste. Indle Des Telephone
- Regen. receivers
Paragon
- Tuned R.F. receivers
Norden Hauck (Shielded
super ten)
- Superhets
National AGS-X



A glimpse of the huge flea-market which started unofficially Tuesday afternoon and ran thru Saturday.



SPOTLIGHT COLLECTOR

I grew up in the Palo Alto area and graduated from Sequoia High School in Redwood in 1930. I joined the Naval Communications Reserve program in 1933 as a radioman third class, having the amateur radio call sign W6CUV, which qualified me for the petty officer rating.

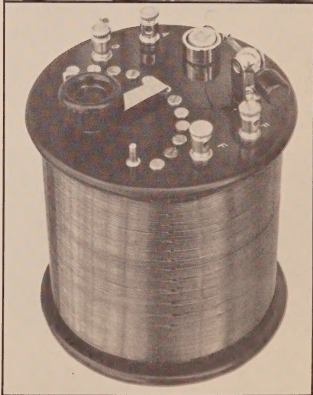
I went on active duty in 1940 at Navy Radio San Francisco, NPG until January 1942 when I was transferred sea. I stayed in the Navy and retired in November 1965. While in the Navy I was in Electronics and Communications.

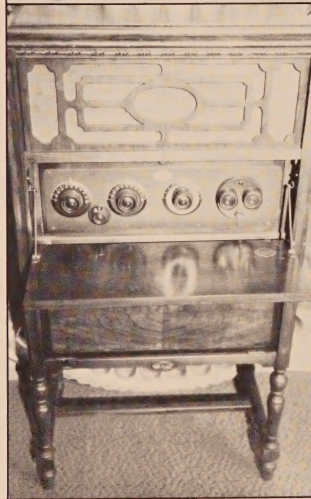
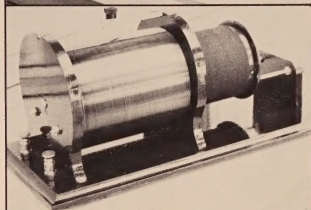
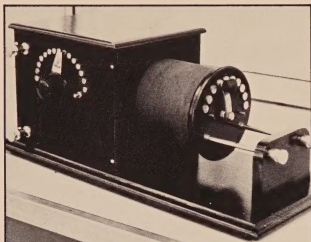
I have always had a keen interest in radio and built my first crystal set about 1922. During high school I worked in a grocery store on Saturdays and was paid \$3.75 for an 18 hour day. There was a radio store in the same block on University Avenue in Palo Alto. We received our pay in the afternoon and I would immediately go to this radio store and buy battery sets for 50¢ to \$1.00. This was in 1928-30 when the AC sets were coming in and battery sets were practically worthless, except to hams and would be hams. I used to tear these sets apart and use the parts for building ham band receivers and small transmitters. I never could afford to buy new parts and for that reason I now have a large collection of new, boxed radio parts from the 20's, that I have bought in the past 6 years.

The collecting bug bit me hard in 1974 when I sold a Collins 51J-4 receiver and shortly thereafter visited a fellow who was selling out his collection. I used this money to buy about 8 battery sets and a couple of 1920's Radio News magazines. From then on, I had it bad and built up a collection of about 45 sets (all 3 dial-



Bob Herbig





ers), and bought over 600 magazines and early radio books. I eventually included a few more expensive sets and have a Kennedy 110 with the 525 Amplifier, A DeForest D-10, and AMRAD 3366one tube reflex, an A-K Model 10, #4700 breadboard in a beautiful solid mahogany desk top cabinet. However, I still prefer the 3 dialers because I think they are more representative of the 20's and more listeners had them, and also because I think some of the more expensive sets are not as attractive.

My greatest interest in early battery radios and crystal sets is in collecting parts and building replicas or homebrew designs of my own using original parts.

I have been buying parts for years and have accumulated a large stock of variable condensers, sockets, audio transformers, rheostats, dials, fone jacks, binding posts and other items that are useful in my building program.

I also have a collection of 45 variometers and am always looking for new ones to add to my collection. I also have a large collection of unusual variable condensers. It includes Remlers, Songbird, Marco, a Meirowsky-Shalkhauser screw type where the rotor looks like a deep thread screw that moves into a mating screw stator, several celluloid covered Acme types as well as Chelsea and Murdock with the celluloid covers.

I am a member of AWA, SCARS (charter), CHRS and ARCA.

I will build any of the homebrew sets shown as well as a few others on order. Delivery will take 10 days to 2 weeks depending on backlog at the time.

Robert F. Herbig W6ME
4178 Chasin Street
Oceanside CA 92054

Feature Set

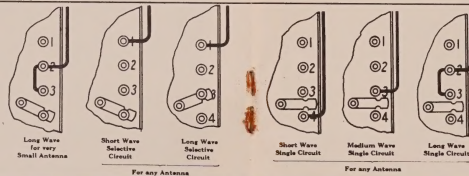
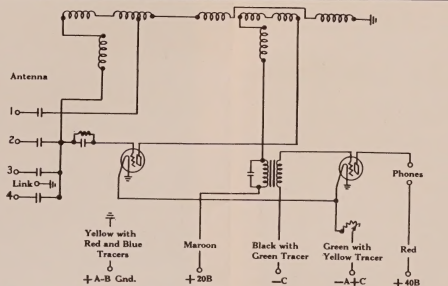
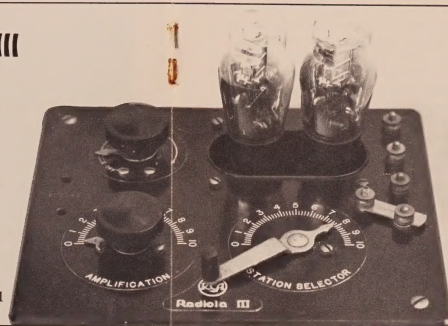
A Radiola III is a commonly owned set among serious radio collectors. Usually one set shows up at every antique radio swap meet. General Electric Made the set for RCA. The Radiola III circuit is simple and is shown in Fig. 1. The set employs a single tube in a regenerative circuit followed by one stage of audio amplification. WD-11's were offered as original equipment along with earphones. Most collectors today, if they have good WD-11 tubes, are concerned about applying voltage to the filaments so normally substitute tubes are used when doing performance test on the set. Since UX 199 electrical characteristics are similar if not identical to WD-11 characteristics they are an ideal substitute tube. Other tubes such as 01A and 30 tubes are electrically similar. The type 30 tube has a somewhat higher Mu and amplification factor than the WD-11.

The author's Radiola III has a good audio transformer but several input antenna capacitors had gone bad as well as the detector grid leak and capacitor. Therefore replacement capacitors and resistor of equivalent value were substituted during the test. The rheostat (3 ohms) which worked well with original WD-11's and a 1½ volt battery (WD-11 filament rating is 1.1V and .25A) was ineffective with type 30 tubes which have a 2 V and .06 A filament rating. So power supply controls were used to adjust and set filament voltages. The audio transformer measured 700 ohms in the primary and 9,000 ohms in the secondary. The turns ratio was 1;7½. The picture shows type 30 tubes in adapter sockets in the set.

The five antenna and ground binding posts located on the right side of the set are easily accessible

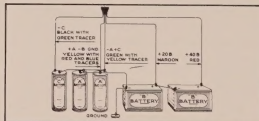
Radiola III

by
Floyd A. Paul



for the various combinations of connections that are required to tune the set for best reception. The original factory service manual suggested six different possible connection patterns. The reason for the complex antenna connections was to obtain an optimum tuning arrangement depending upon the number and power of the local transmitting stations. The series and parallel arrangement of the capacitor connections gave better coverage for portions of the broadcast frequency spectrum and gave a choice between selectivity vs sensitivity and ease of operation. See Fig. 2 for description of antenna/ground connections. The decal on the Radiola III box advertised 220-550 meters (1364 KHz to 545 KHz). The service manual indicates approximate coverage as 195 to 640 meters (1539 KHz to 469 KHz).

The set is economically constructed. There are no variable capacitors hence costs were reduced. The set tunes rather broadly. It is small, being 7 3/4 x 4 7/8 x 6 1/2" high. The battery cable had clearly marked voltage terminal leads for easy power supply connection. There is a metal plate behind the black bakelite front panel that is connected to A plus, B minus and is therefore ground potential. It is about 3 x 5 1/2" with 90° flanges and serves as a chassis vane for mounting the tubes and audio transformer as well as a body shield isolation plate to reduce hand capacity detuning effects.

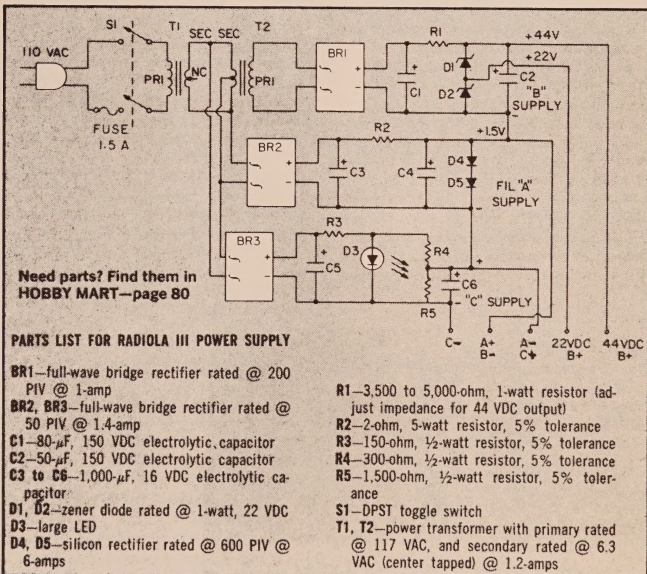


Radiola III Power Supply

by James A. Fred

Battery Eliminators. One of the problems mentioned frequently by readers of this column is that of powering up old battery-operated radio receivers. In a previous column, I reviewed an all purpose power supply that would operate from one to six-tube battery radios. Within the past month, I have heard from three readers who have just one radio set, a Radiola III. These readers stated

that this was the only old radio they would ever bother with, but all three wanted their radios to play. This presents a problem, since the instruction book calls for three #6 drycell batteries of 1.5-volts each, and two 20-volt "B" batteries. At today's prices, #6 drycells are about \$2.00 or more each, and a 45-volt battery with a tap at 22.5-volts sells for about \$9.00. So here you have a bill for \$15.00 worth of batteries before you can play your Radiola III. Not only are they costly, but you can hardly find a store that sells them. A friend of mine is making his own "B" batteries. Radio Shack had a sale on "AA" size batteries during January, and he



bought 100 of them. These will produce 150-volts when connected in series. This is enough for 3 "B" batteries, but since the available power is low, I doubt they would operate a multi-tube radio for very long. Commercial power supplies are available, but cost over \$100.00 each. These power supplies are great if the collector wants to operate many different radios. One Canadian reader stated that a power supply delivered to his home by the Canadian Post Office would cost at least \$130.00, including shipping charges and import duty. He wanted to know if there was a cheaper way to operate his Radiola III. This started me to thinking about the problem, and I then designed a power supply especially for this set, using WD-11 tubes.

James Fred is author of "Antique Radio Corner" in Elementary Electronics, a Davis publication. This is an excerpt from July/August 1979 issue, and may not be reproduced.



Looking for a WD-11 replacement? The VT-24/864 tube has the same exact electrical characteristics as the original WD-11 tube. The base configuration requires that you swap the four pin base with a WD-11 type base or use an adaptor.

Antique Radio parts

Box 42, Rossville, IN 46065

They supply WD-11 style black phenolic bases. If you don't feel up to mounting the VT-24/864 to a new base, they can do it for you. If you have no tube they can supply the tube and base. Also available is a "four pin to WD-11" adaptor for use with a 199 or 30 tube in a WD-11 application. Write for prices and information.

The Magnavox Tube

by Russ Winenow

A very interesting and informative article on "Valves" by the technical staff of the early magazine Popular Radio of July-August 1927 describes the Magnavox tubes in three versions. The first designated as type 150-d was described as a Detector Valve of quality, extremely quiet, not easily overloaded and interchangeable with any 5 volt $\frac{1}{4}$ ampere type. Next was another detector which will "Pep Up" your reception. It was designated a 200A type and designed for greater sensitivity than the UX201A, and again 5 volt $\frac{1}{4}$ ampere filament. Finally a "Sturdy Vacuum Tube for Standard Use" designated 201A. The outstanding feature was low internal capacity. All were equipped with the standard UX base. The glass tapered upward on all these tubes giving them a distinctive appearance.

An earlier, and I suppose the original version of this tube is fully described in the accompanying article from QST of March 1925. The tube in my collection has the words "The Magnavox Co. Oakland, California Pats. applied for. Made in U.S.A.". This stamping completely encircles the vase at the top near the glass. All four pins have very small holes for the lead wires and do not appear to have been soldered, they are approximately $\frac{3}{8}$ inches long and seem to have been crimped into a square shape near the ends. Evidently several changes were made between 1925 and 1927.



The New Magnavox Tube

By Herbert E. Metcalf*

MODERN radio reception has changed radically in several ways in the last few years. First, in the almost universal use of radio frequency amplification for broadcast reception; and second, in the adoption of low-wave trans-

mission, only three metal parts are involved—control electrode, anode and filament spring. These parts are all die stamped and are therefore, always alike. The control electrode is formed of a single piece of metal, slotted to receive the filament. This slot is provided on its edges with teeth, the teeth being bent laterally, away from the plane of the filament. This lateral bending not only gives increased electron control, but also widens the control field and makes it possible to secure uniformity in tube characteristics despite slight mechanical variations in manufacture. The writer has found that such teeth or serrations are necessary in order to obtain proper control action. The teeth alone control the electron stream and the remainder of the control electrode acts simply as a support for the teeth. By varying the number, size, shape and position of the teeth, tubes can be made to duplicate the characteristics of standard grid tubes, in much the same way as the number of grid wires control the characteristics of the grid tube.

After the control electrode is mounted the filament is placed within the slot as shown in Figure 2, the anodes are placed in position. The complete assembly is shown in Figure 3. It is to be noticed that the anodes are not parallel to the plane of the filament but are spread slightly at the bottom. The tube is then sealed and pumped by a new method which removes all undesirable gasses in about 80 seconds. The finished tube is shown in Figure 4, which also shows the method of insulating the prongs in the base.

Electrical Characteristics

The audio frequency characteristics of Type A tubes are practically identical with those of the Radio Corporation, Cunning-

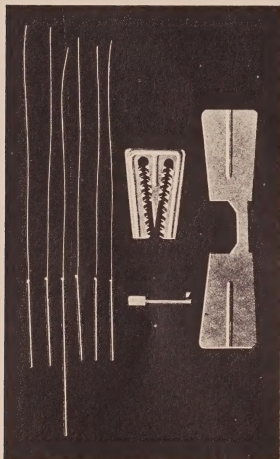


FIG. 1. METALLIC ELEMENTS USED IN TYPE A TUBES.

mission and reception for amateur traffic, more particularly in continuous waves.

The vacuum tube I am about to describe was developed with the idea of meeting the needs of both these changes. The secret of efficiency in radio-frequency amplifications, oscillation and detection in the wave band of from 20 to 600 meters, lies in making a vacuum tube having a low internal capacity and yet being able to handle a fair amount of power.

Magnavox Type A Tubes are a radical departure from standard tube practice and have a low inter-element capacity without loss of other essential characteristics.

Referring to Figure 1, it will be seen

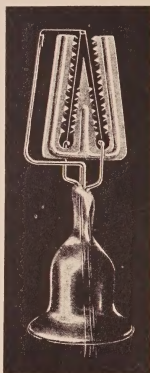


FIG. 2. PARTIAL ASSEMBLY SHOWING CONTROL ELECTRODE AND FILAMENT RELATION.

* In charge of Research and Development, Vacuum Tube Division of the Magnavox Company, Oakland, California.

ham, or DeForest Storage Battery Tubes, with the exception that the output impedance is slightly lower, with consequent



FIG. 3. COMPLETE INTERNAL ASSEMBLY WITH PLATES IN PLACE.

Type A tubes and a number of standard storage battery tubes were measured on a General Radio Precision Capacity Bridge, and the averages are given in the following table:

	Control Electrode to Filament $\mu\text{fds.}$	Plate to Filament $\mu\text{fds.}$	Control to Plate (Fil. Free) $\mu\text{fds.}$	Control to plate (Fil. Gndd) $\mu\text{fds.}$
Average Type "A" Tubes	5.0	5.0	5.0	2.4
Average Other Tubes	6.5	6.0	11.2	5.5

Thus it is seen that the highest internal capacity is not over 5 $\mu\text{fds.}$ and that the filament-grounded control-electrode-to-plate capacity is only 2.4 $\mu\text{fds.}$ and less than half that of standard tubes. There are two reasons for this low capacity. The control electrode is composed of just one flat piece of metal instead of a cylindrical grid. This alone reduces the control-electrode-plate capacity greatly. The other factor lies in the greater plate spacing employed in the Type A tube. The fact that electrons are free to pass to the anodes without obstruction, allows greater spacing for the same impedance. In practice I have found that the same impedance can be ob-

tained with about double the spacing of the ordinary grid tube. The writer is now working on elimination of capacity to a still greater extent by reducing the actual amount of metal to practically the teeth only. This should bring the internal capacity of the tube to very close the capacity of the leading-in wires.

This low internal capacity makes Type A tubes hard to oscillate in tuned plate circuits. This means that tuned R. F. amplifiers are practically self-neutralizing when Type A tubes are used. When using electromagnetic feedback, however, they become highly oscillatory and oscillate freely and steadily for C. W. reception down as low as 20 meters without the least trouble. I am inclined to believe that tubes used without the base can be made to oscillate at lower wavelengths, but no experiments have yet been made to determine the extreme bottom range.

In conclusion, I will say that Type A tubes in audio frequency circuits give a beautiful clarity of reproduction. Careful

Inter-element Capacity

For comparative figures a number of

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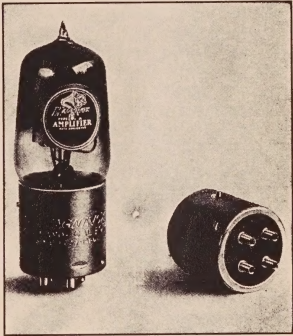


FIG. 4. COMPLETED TUBE AND VIEW OF BASE SHOWING BAKELITE INSULATION.

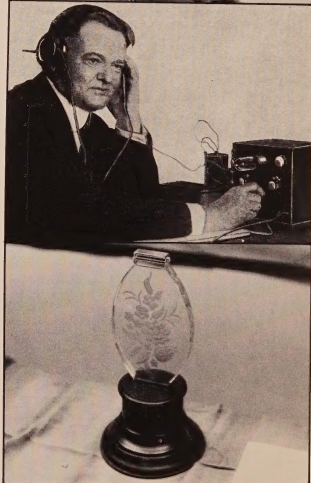
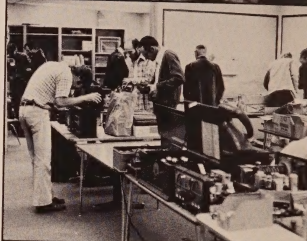
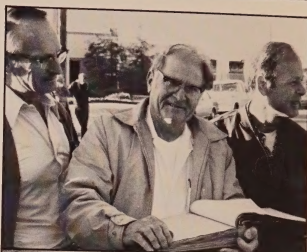
experiments have indicated that Type A tubes will operate with maximum efficiency as follows:

1. Detector using control-potential control-current characteristics for rectification.
2. Detector using control-potential plate-current characteristics for rectification.
3. Radio frequency amplifier at low wave lengths.
4. Intermediate frequency amplifier.
5. Oscillator both low and high wave lengths.



New Members

- Charles C. Barone
Norwood Park TWP, Ill.
George F. Boettcher, Jr.
Dingman's Ferry, Pa.
J. Douglas Brighton
Hanover, Ontario, Canada
Harry E. Burke
Plattsmouth, Neb.
Edward J. Bzovy
Covina, CA.
Thomas B. Caldwell
San Mateo, CA.
Keith M. Carr
Millbrae, Ca.
Melvin R. Comer
Ardmore, Pa.
Dr. Max C. De Henseler
New York, N.Y.
Gordon G. Ekland
Prospect, Ky.
David W. Fletcher
Oakland, Ca.
Mark B. Forer
Santa Ana, Ca.
Gregory C. Greenwood
San Rafael, Ca.
Franklin C. Haas
Hutchinson, Kansas
Christine Hartzell
Berkeley, Ca.
Herbert K. Huber
Walnut Creek, Ca.
Frank Kohl
Mc Lean, Va.
Frank Krantz
Somerdale, N.J.
Serge L. Krauss
Elkhart, Ind.
Louis F. Lindauer
Port Washington, N.Y.
Steven L. Lohse
San Jose, Ca.
Ernest L. Madison
San Pablo, Ca.
Donna Miller
Oakland, Ca.
Gail M. Miller
Oakland, Ca.

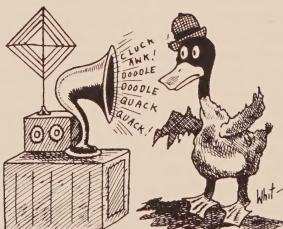


meet



- Sam M. Miller
Silver Spring, Md.
Dr. Ralph W. Muchow
Elgin, Ill.
Hugh Mc Kinney
San Pedro, Ca.
Charles A. Perry
No. Olmsted, Ohio
James J Pezzulo
Windsor, Conn.
D.H. Potter
El Cerrito, Ca.
Frank Refalo
Sunnyvale, Ca.
Emil Schneider
Sacramento, Ca.
W.B. Smith
Taft, Ca.
James E. Stephens
Florence, Ala.
Lcdr. W. J. Stillmaker
Concord, Ca.
D.C. Sumner
Davis, Ca.
Roy T. Tucker
La Mirada, Ca.
Russ Turner
San Francisco, Ca.
Silvano Volpini
Toronto, Ontario, Canada
Ed Wilush
Maitland, Fla.

A RADIO QUACK



"I don't know what he's saying; but it sounds like fowl language to me!"—MAX WHITSON.

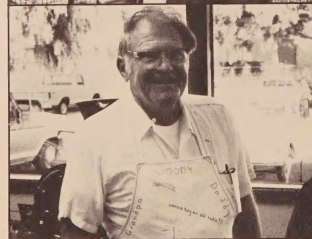
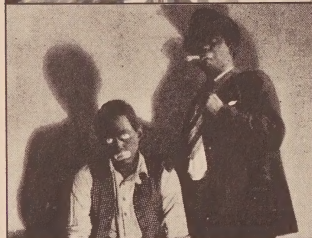
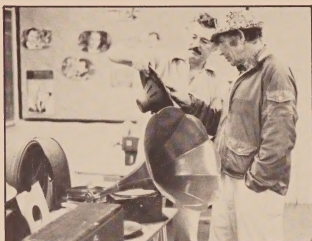
Restoring Old Radios

by Wm. Herbert Brams

Having restored over 250 sets—mostly of 1928-1940 vintage, I have found that the following procedure restores the set to good condition with a minimum of trouble.

- (1) Obtain a suitable circuit diagram and service information, usually from Rider's Perpetual Troubleshooters Manuals.
- (2) Test the types. I have found that the tubes in a set are usually good, perhaps only one or two need replacing. Occasionally, a tube will test good but will not operate well in the set. These should be replaced.
- (3) Check the resistance of all coils and transformer windings. Usually, these are o.k. but fairly often the output transformer or speaker field coil is open. For the latter, I replace the speaker with a permanent magnet type and the field coil with a 10 watt power resistor mounted under the chassis, well away from other parts. Drill a few holes in the chassis above the resistor to allow the heat to escape. If you wish to retain the original appearance of the set, the speaker itself can be restored.
- (4) Replace all capacitors. Old electrolytics are not to be trusted even if they test good, and tubular capacitors have usually become leaky. Good capacitors can be obtained inexpensively from the various electronic surplus outlets.
- (5) Check the resistors. These usually are still good, although





a few may need replacing.

(6) After satisfying yourself that all the components in the set are in good condition, turn the set on and check for shorted power transformers. In my experience this occurs rarely.

(7) Measure the voltages. Usually they will be correct although your values may not agree with those given in the service information as these were commonly measured to the cathode of the tubes.

(8) At this point, the radio should play. Assuming that it does, observe it for a while for any further problems. These are usually caused by a noisy or intermittent tube. Occasionally, dirt has gotten into the speaker causing a raspy tone. Clean this out or replace the speaker.

(9) Finally, realign the set. If you use metallic alignment tools, remove them from the adjustment screws before taking a reading as metal often affects the results. Occasionally, an IF transformer will be partially open and you will be unable to peak it. This should be replaced.

This work does not involve any special instruments beyond a soldering iron, VTVM, and signal generator. The results are extremely gratifying: even inexpensive table models prove to have good sensitivity and selectivity with only a few feet of wire for an antenna. If you wish to preserve the original appearance of the set, the new components can be mounted in the original containers. One final note: I usually paste an envelope containing the service information inside the set so that the information is always readily available.





PUBLICATIONS



Montgomery Ward Catalogue:

This Company has been in existence in the United States for many years and at the present time is one of the leading retail chain store operators in the Country. During 1922, the company published a 34 page catalogue (7"X 9" approx.) which advertized "Wireless Telephone and Wireless Telegraph Equipment then offered at the Company's stores. Worthwhile reproductions are now available. The catalogue provides a wealth of pictures and data on a number of sets and many components of that area. If interested, you can't go wrong at the nominal price of \$.70 plus postage. Contact KLIPSCH and ASSOCIATES, INC. Box 688, Hope, Arkansas 71801

Dr. Nikola Tesla Bibliography

The following information was excerpted from a publisher's release and is not based on a review of the book by me. This is a recent publication and has not yet appeared on the shelves of local bookstores.

"An exhaustive edition of an annotated bibliography of writings by and about Nikola Tesla (1856-1943). The period covered is from 1884 through 1978. Approximately 3,000 citations are included, arranged chronologically, plus a complete list of U.S. patents granted to Tesla, arranged by date of application. All earlier, lesser bibliographic efforts have been merged in this edition, with both North American and European sources cited.-----".

This publication covers 230 pages and is priced at \$18. I suggest you contact me if interested since the publisher is located nearby and I may be able to expedite delivery. (postage extra).

Tesla's Technology:

This is the name of a new magazine published six times yearly, 8½" x 11", printed offset. It is my understanding that each issue contains a feature article, a reproduction of a Tesla patent and of an old article by Tesla, serial articles, notices and classifieds. Subscription cost-\$10 yearly. Contact Tesla Research Society, 151 Grofftown Rd. Lancaster, Pennsylvania, 17602

Silver Ghosts-By JWF Puett:

A soft-bound publication which provides 72 pages of photographs, circuits and technical information on all the classic models of the justly famous Scott radios. Commencing with the eight valve "World's Record Super 8", circa 1925, the book takes the reader through 1941. Commencing about 1930, the chassis were constructed of heavy chrome-plated steel and thus became known as "Silver Ghosts". Perhaps the largest receiver of its kind ever built was the 40 valve Scott Quaranta which was built to special order during 1935 and which is discussed at length in this publication. Contact Puett Electronic, P.O. Box 28572, Dallas, Texas, 75228 Cost-\$8.95

Vintage Radio-1887 to 1929-\$8.95 A Flick of the Switch-

1930 to 1950-\$8.95

Again I call your attention to these publications because they are the "bibles" of the American collector, are no longer in print, and the Vintage Radio Company ceased operations on July 31, 1979. However, the remaining stock is being liquidated and this may be your final opportunity to get these publications from the orig-

inal source. Reprints of "Gernsback's" 1927 Radio Encyclopedia also still available in Deluxe hard-cover for \$14.95. Contact McMahon Vintage Radio, Box 1331, North Highlands, California, 95660

Instructions for Atwater Kent Open-mounted Style Radio Receiving Sets

I have been informed that this is a reproduction of unusual quality using offset printing and that it illustrates many breadboard models including the "5", the "9", the "12" and others. Also included is a checklist of trouble points and other pertinent data re breadboards. This 12 page manual is obtainable from Arthur W. Aseltine, 345 Glenwood Street, Ann Arbor, Michigan, 48103 at a cost of \$3.00 postpaid.

Ham Radio Horizons

(Sept. 1979 Issue)

You may be surprised to find this publication discussed in this column. However, ham magazines are quite interested in publishing articles dealing with the historical aspects of radio (more about this later). I definitely recommend this issue which includes a lengthy article by Paul C. Crum (W9LC) in which he ably discusses the various early tuning circuits, early tubes, capacitors and early inductors and audio circuits. The article includes several photographs of early sets, components, tubes and speakers. The author tells his story simply but informatively which means that this article is worth the effort and expense. At \$1.25 for this issue you can't miss.

Radio-Electronics

(October 1979 issue)

This is the 50th anniversary

issue of this publication which was first issued under the name "Radio-Craft" in July 1929. This issue includes 32 pages covering the development of commercial radio and television as seen through the pages of this well-known publication. As one reads this story, it is ever-increasingly apparent that Hugo Gernsback, together with a group of prominent authors, not only provided a historical record of their times but were often well ahead of their times. Good reading for \$1.25.

Ham Radio Magazines

One of our tenets "to promote the restoration and preservation of early radio". This is obviously all-inclusive yet many collectors have little interest in the vital contributions made by the radio amateur over the years. As collectors, whether or not we have a ham license, we can find excellent articles on early amateur receivers and transmitters by referring to issues of current ham magazines. A few of these are listed below to whet your appetite:

Article	CQ Issue:
Horn Speakers <i>Floyd Paul</i>	12/79
The National SW3 Revisited <i>Bill Orr</i>	2/78
The National SW2 <i>Bill Orr</i>	10/77
The Famous 210 Tube <i>Bill Orr</i>	12/76
The Story of the Mc Cullough Tube <i>J. K. Bach</i>	9/75
The HRO Receiver <i>Bill Orr</i>	5/75
The National SW3 <i>Bill Orr</i>	7/71





NOVELTY NOOK

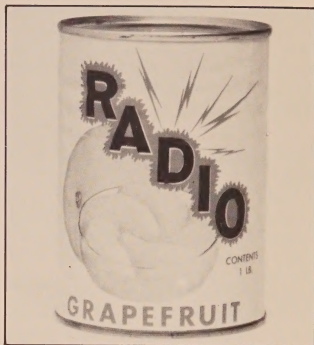


RADIO SHOT GAME

submitted by Allan Bryant

This game was made by the American Game and Toy Corp., of Brooklyn, N.Y. The game is made of tin and has indentations on the playing field, each of which are labeled with the name of a major city and a numerical point value. To play the game a marble is set in the hole on the spring launcher and shot toward the "horn" at the opposite end of the game. The marble goes into the horn and out a hole at the base, then onto the playing field.

New York: 5-pts
Chicago: 10-pts
Detroit: 20-pts
Atlanta: 25-pts
Pittsburgh: 30-pts
L.A.: 40-pts
Wash.D.C.: 50-pts
Newark: 75-pts
Havana: 100-pts



RADIO GRAPEFRUIT

submitted by Ed Sage

This tasty item was seriously distributed by the Radio Foods Corporation of Lawrence, Mass. in 1932. The one-pound contents are still sloshing around inside the can and the label is in excellent condition, another testimonial to the radio craze of the 20's and 30's.



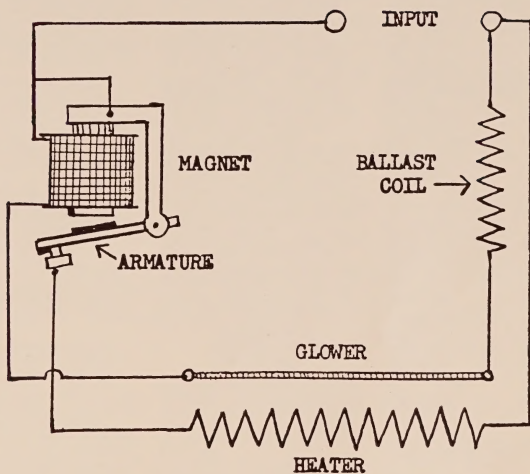


Fig. 1 Schematic for Nernst Glower
for Sept. '79 Journal



COLLECTOR AIDS



FOR SALE: Crosley XJ-\$125 Radiola 25 with ant. -\$125 Lefax Handbook (1922) and most 1923 supplements-\$25

Mesco Cat. #9 (1916)-\$35 1925 Ency. of Radio Sets, 247 pictures, 20 pages, repro-\$3.75 SASE for more-Floyd Paul, 1545 Raymond Glendale, Calif. 91201 (213) 242-8961

WANTED: Hallicrafter receivers before 1940, for private collection. Please write, stating description, condition and price. (Max C. de Henseler, HB9RS, 320 East 42nd. Street, Apt. 801, New York, N.Y. 10017)

WANTED: RCA power-audio chassis as used in 1926 radio/ phono combos and in Radiola 28 AC model. Three or four tube unit OK. See Riders V.1, p. 485, 506-510 for details. Also want RCA horseshoe magnet phono pickup head working or not.

Jerry Newton, Rt. 1 Box 262, Woodland, CA 95695

WANTED: Fine tuning variable condenser for De Forest D-10. Joe Horvath, 522 Third St., San Rafael, Calif. 94901

FOR SALE: Radios, Tubes, Speakers, Tube Testers, Radio Magazines, paper-plus more. List 1-80 50¢ and SASE with two stamps. Krantz, 100 Osage Ave., Somerdale N.J. 08083

WANTED: Schematics- will pay going rate for copies of the following: ERLA-S51 and CLAPP-EASTHAM RAKAK MODEL DD. Also seeking certain 1919 and 1920 QST's. (Dave Brodie, 315 Cotton St., Menlo Park, CA 94025)

WANTED: Philco Model 70 chassis or chassis and front panel for a Philco model 70 Grandfather clock. Jack Gray, 1162 Broadmoor Dr., Napa, Cal. 94558

FOR SALE: Reproductions of red pushbuttons for late 30's Philco radios (\$5.50). Send me an original button so that I may match the length. Wm. Herbert Brams, 2427 Durant #4, Berkeley, CA, 94704

WANTED: Rider Radio Volumes 1 through 7 to complete my (Riders Perpetual troubleshooters Manual). Round plastic disk with numbers on it for Philco Model 37-84B Cathedral. Also chassis for model 84 and Atwater Kent Model 84 Cathedral Radios. Roy Yost, 535 Geneva Ave, #2, Redwood City, Calif. 94061 (415) 368-6366

WANTED: Philco Model 70 dial-Tuner. Radiola Model 17 brass dial bezel. Jon Karstens, 1320 Soto Court, San Jose, Calif. 95121 (408) 227-3463

FOR TRADE: Kennedy 281 short wave receiver and Radio Craft Magazines. Have years 1929-1948 Looking for a Michigan Model MRC-2 as per U.R. PG. 128. Also need many issues of Radio News to complete my set. Jim Cirner, 13366 Pastel La., Mountain View, Calif. 94040 (415) 967-7672

Old Radio Shows on cassette tapes are available from the Ferry House Comedy, Drama, Mystery, and Speciality shows are offered. For information and pricing write:

The Ferry House
554 North State Rd.
Briarcliff Manor, NY,
10510

WANTED: 1930-40 radio made by wholesale radio service AKA "La-fayette", works for radiola VIII table model, chassis for Philco 90, musicone speaker for Crosley Show Box.

S. Coulter, #11-A, 1000 Columbus, Bakersfield, CA 93301

FOR SALE: De Forest replica parts, also one acmelex receiver, it has three stages of untuned R.F. and three stages of reflex audio Amp. and crystal detector. All transformers are good, a very nice set \$90.00

Joe Horvath, 522 Third St., San Rafael, Calif. 94901

WANTED: Info on RCA Hyperion (1926) panel layout and placement of subchassis. Riders, V.2. RCA Service Notes, unabridged, all vols. Type 22 (cx322, 222, 22) tubes. Jerry Newton, Rt.1, Box 262, Woodland, CA. 95695

Interested in obtaining information on the Indiana Historical Radio Society? Drop a note and SASE to Ed Taylor, 245 N. Oakland Ave. Indianapolis, IN 46201 for information and application to the Indiana Historical Radio Society.

WANTED: 1-2-and 3 tube battery sets and crystal detector sets. Need not be working. Can be Junkers as long as panel is unbroken and cabinet is restorable parts can be missing. I have De Forest D-10, Crosley X, Splittdorf R-500- Magnavox 2 tube amp-Howe X tal set for sale or Trade. Dave Brodie, 315 Cotton St. Menlo Park, CA 94025

FOR SALE: Arborhorne five good tubes and 100 A RCA speaker works well and is clean and like new. \$95, will pay shipping charges. Arthur J. Bardish 4042 Herman Ave. S, Grand Rapids MICH 49509

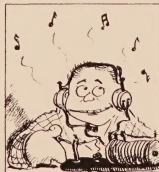
FOR SALE: Loctal, Octal and Miniature Tubes. Also will duplicate metal parts, build power supplies for battery radios and repair sets for collectors. S. Coulter, #11-A, 1000 Columbus, Bakersfield, CA 93301

RADIO RHYMES

No. 7



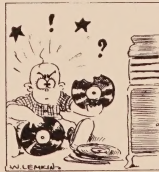
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WITH TUNES THAT CHEER
AND BRING A SMILE



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RAPTURE SWAY -
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THE AIR!" WE SAY



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YOU CAN TELL
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IS ALSO "MUSIC IN
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